

**Department of Civil Engineering**

**Report on**

**Visit to “Zero waste generated Water Treatment Plant (Khanpur, Vadodara) and Sewage Treatment Plant (Atladara, Vadodara)”**

Department of Civil Engineering, GCET has organized one day (01/04/22) educational visit to “Zero waste generated Water Treatment Plant (Khanpur, Vadodara) and Sewage Treatment Plant (Atladara, Vadodara)”. A total of 28 students (3<sup>rd</sup> year) along with Dr. Snehal Popli visited the treatment units.

**Aim of Visit:**

The main aim of visit is to understand the various components of water and sewage treatment plant and functions of each component detail and how practically they are solving the day to day problem if arises. To get the knowledge of zero waste generated water treatment plant.

**About the Visit:**

**Report on a visit to Water Treatment Plant (Khanpur)**

The capacity of the Zero waste generated water treatment plant is 75 MLD and supply treated water to the Gotri, Harinagar, Vasna and other nearby region. The source of water is Naramada Canal. Components Observed are:

- Intake sump
- Flash Mixer
- Clarifloculator
- Rapid Sand filter
- Clear water reservoir
- Chlorinator unit
- Dirty water and sludge collection sump
- Sludge thickener
- Air Compressor

Initially, they do the pre-chlorination of the water. Powder Activated Carbon (PAC) was added to the water in the flash mixer tank. Water is then allowed to go in clariflocculator. Two units of clariflocculator are provided. The flocculator depth is around 12 m and the outer clarifier depth is 6 m. Scrapers provided in the clarifier that takes 45 min to complete one revolution. Sludge from the clarifier is collected in the dirty water sump. After clariflocculator, water is entering into the Rapid sand filter. There are 8 units of Rapid sand filter. The filtered water is collected into the clear water sump. There are various apprentices provided for backwashing. The backwashing is done 6 times a day. The wash water is again collected in the dirty water sump. The students have witnessed the backwashing procedure. First of all, the air is allowed to pass through the compressor to lateral pipes to main central pipe to filter media for 15 min. Then the wash water enters in the lateral pipe through the wash water valve. The wash water is collected in dirty water sump. After the clear water sump the water is sent to the water tank to the cities.

The dirty water which is collected in the dirty water sump is then going into the sludge thickener tank. There are two sludge thickener tanks. Separated sludge is going into the fertilizer making machine. The water separated from the thickener is again going to the inlet chamber. So this is reason why they are saying it is zero waste generated treatment plant.



## Report on a visit to Atladara Sewage Treatment Plant

The Atladara STP treats 43 MLD Domestic Sewage waste and then releases the treated sewage in Vishwamitri River. The sewage from the main pumping station comes into the inlet chamber where the bar screen is provided at an angle of 45 degree. The screen removes all the floating matter like paper, plastic bottles, wood pieces, braches of trees etc. which are then disposed directly through a belt conveyor. Then the sewage is entered into the Grit Chamber which consists of pedals moving with low rpm (i.e. slow stirring). When the amount of grit increases, the sewage is taken to the grit classifier and it rotates such that all the grit is collected at one side. After that the velocity of sewage is increased by using parshall flume (10 x 1.5 x 1m). Then the

sewage enters into division box-1(2.25 x 3.1 x 0.75m) where further the sewage is distributed evenly in 3 other division boxes for further treatment.

UASB (Up-flow Anaerobic Sludge Blanket) technology is used for the Secondary treatment process of sewage. Here the sewage enters from the bottom of a blanket of sludge where anaerobic degradation of sewage occurs and methane gas that is released through this process is taken to the biogas plant through a pipe and carbon dioxide is released in the atmosphere. Further the sewage is taken to the Pre- aeration tank where the sewage is mixed constantly and the remaining gaseous impurity (<0.01%) is removed. Then it is taken to the aeration tank(52 x 26 x 4m) where the activated sludge is added to the sewage along with oxygen for aerobic degradation. Pedals are provided in this unit for proper mixing of sludge with the sewage and aerated water is passed through surface aerators. There were two aeration tanks with 4 rotors in total.

Further the sewage is taken to the secondary clarifier [42.8(dia) x 3m] where slow stirring is done. The sewage enters into circular clarifier tank from the centre and then is distributed towards the circumference of the tank. Due to the slow stirring, sludge is collected at the centre of the tank and clear treated water is then released in Vishwamitri River. The sludge from the clarifier can be used again in the aeration tank (70%) via return sludge sump [16.60(dia) x 25m] and parts of it is taken to the sludge thickener [6(dia) x 3m] and then to the sludge drying bed (23 x 30m) where addition of chemicals is done and fertilizers are prepared. The Gas holder station [10(dia) x 6m] collects the gas produced from the UASB unit and the gas is used to generate electricity for operating the plant. Various tests like BOD, COD, DO, solids and MLSS are performed before and after the treatment of sewage. The inlet COD of sewage is around 400 mg/L and after the treatment it is around 100 mg/L. Also the BOD of the outlet after treatment is less than 20 mg/L.

Overall, it was a very informative visit for all the students. The working staff of both the treatment plants was highly cooperative and made maximum efforts to make us understand the concepts lying behind each and every unit very precisely.

